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Revision of the wingless *Sikkimia* Duvivier (Coleoptera, Chrysomelidae, Galerucinae) from Taiwan, including a new generic synonymy and four new species descriptions

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Abstract

The genus *Taiwanolepta* Kimoto, 1989 (type species *T. babai* Kimoto, 1989) is proposed as a junior synonym of *Sikkimia* Duvivier, 1891. *Sikkimia* species from Taiwan form a group characterized by the reduction of their hind wings. Most of them cannot be distinguished using external morphology, except by the structure of last two antennomeres in males. Diagnoses are made by using distribution, aedeagal, and gonocoxal morphology. The group includes one previously described species, *Sikkimia babai* (Kimoto, 1989), **comb. n.**, and four new species, *S. meihuai* **sp. n.**, *S. sufangae* **sp. n.**, *S. tsoui* **sp. n.**, and *S. yuae* **sp. n.** Speciation models, supporting the high diversity of *Sikkimia* species in Taiwan, are discussed. *Sikkimia metallica* Jacoby, 1903 and *S. tamra* Maulik, 1936, both from southern India, are transferred to the genus *Cerophysa* Chevrolat, 1836.

Keywords

Leaf beetles, *Polygonum chinense*, nocturnal behavior, taxonomic revision

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Introduction

Subsequent to the original description of the genus, several new genera have been proposed for *Sikkimia* species. Based on the study of type specimens, the genera *Yunomela* Chen, 1964 and *Vietocerus* Lopatin, 2003 were synonymized with *Sikkimia* by Bezděk and Zhang (2006). Another genus, *Taiwanolepta* Kimoto, 1989, is here synonymized. While continental *Sikkimia* species have well developed wings and are capable of flying, the Taiwanese species have, until now, been classified in *Taiwanolepta* and are wingless and nocturnal. In Taiwan, *Sikkimia* species appeared to be rare as no recent records had been reported.

The basic bionomics of Taiwanese *Sikkimia* populations can be summarized as follows: adults are nocturnal and closely associated with these host plants: *Polygonum chinense* L., *P. posumbu* Buch.-Ham. ex Don, and *P. thunbergii* Sieb. & Zucc. (Polygonaceae); *Rubus swinhoei* Hance and *R. corchorifolius* L. f. (Rosaceae); and *Dumasia miaoliensis* Y. C. Liu & F. Y. Lu subsp. *bicolor* (Hayata) Ohashi & Tateishi (Fabaceae); mainly feed on the host plant *P. chinense*. This plant is widely distributed and grows on the edges of forests, roads, walking trails, and rivers. As these environments are easily accessible, adults can be collected by searching for adults on host plants at night. Approximately 350 specimens have been collected throughout Taiwan by members of the Taiwan Chrysomelid Research Team (TCRT) led by author Lee.

Materials and methods

Larvae were put into small glass containers (diameter 142 mm × height 50 mm) with cuttings from their host plants at average 20.8 °C, 74%RH, with a photoperiod of 12:12 (L:D) for laboratory rearing. When mature larvae began searching for pupation sites, they were transferred to smaller plastic containers (diameter 90 mm × height 57 mm) filled with moist soil (about 80% of container volume).

The abdomen was separated from the body and boiled in a 10% KOH solution, followed by washing in distilled water to prepare genitalia for drawing purposes. The genitalia were then dissected from the abdomen, mounted on slides in glycerin, and studied and drawn using a Leica M165 stereomicroscope. For detailed examination a Nikon ECLIPSE 50i microscope was used.

At least three pairs from each species were examined to delimit the variability of diagnostic characters,. When a species was collected from more than one locality, at least one pair from each locality was examined. Females are associated with a distinct species based on localities where they were collected. Length is measured from the anterior margin of the eye to the elytral apex, and width at the greatest width of the elytra.

Specimens studied herein are deposited at the following institutes: The Natural History Museum (BMNH), London, UK; Jan Bezděk collection (JBCB), Brno, Czech Republic; Ehime University (EUMJ), Matsuyama, Japan; Kitakyushu Museum of

Natural History and Human History (KMNH), Kitakyushu, Japan; TARI: Taiwan Agricultural Research Institute, Taichung, Taiwan. Depositions are indicated with their recognized abbreviations except for those deposited at TARI.

Taxonomy

Genus *Sikkimia* Duvivier, 1891

Sikkimia Duvivier, 1891: 154 (type species: *Sikkimia antennana* Duvivier, 1891, by monotypy); Maulik 1936: 520 (redescription).

Yunomela Chen, 1964: 201 (type species: *Yunomela rufa* Chen, 1964, by original designation); Bezděk and Zhang 2006 (as synonym of *Sikkimia*).

Taiwanolepta Kimoto, 1989: 73 (type species: *Taiwanolepta babai* Kimoto, 1989, by original designation). **New Synonym**

Vietocerus Lopatin, 2003: 103 (type species: *Vietocerus kabakovi* Lopatin, 2003, by original designation); Bezděk and Zhang 2006 (as synonym of *Sikkimia*).

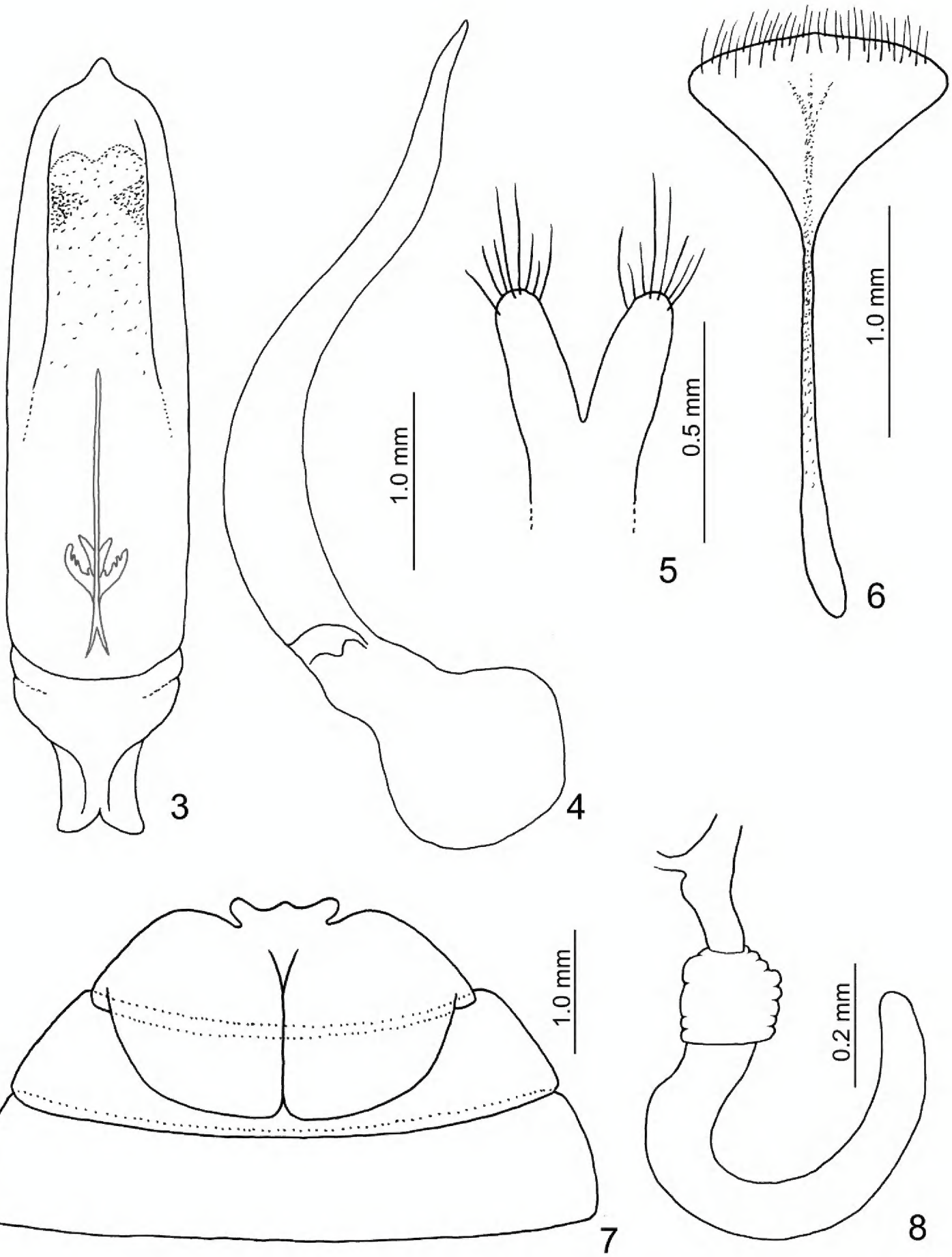
Remarks. The diagnostic characters for the genus *Sikkimia*, as indicated by Bezděk and Zhang (2006), are modified and extended as follows: body large (6.1–12.0 mm), robust, orange, red or brown; last two segments of antennae strongly enlarged in most males (Figs 1–2); frontal tubercles large, sub-quadratic; pronotum with antebasal transverse impression, limited on sides by short longitudinal furrows, and an additional longitudinal groove half way between short longitudinal furrows and lateral margin, running parallel to the lateral margin (Fig. 1); all pronotal margins bordered; procoxal cavities closed; apical ventrite trilobed in male, with internal anterior margin extended (Figs 7, 48 & 49); and claws appendiculate.

As all the main diagnostic characters are shared by both the continental and Taiwanese species, *Taiwanolepta* is here synonymized with *Sikkimia*. Taiwanese species differ from the continental species in having a shorter body (6.1–9.0 mm) reduced hind wings and consequently reduced humeral calli. The apical antennomere in the male is spear-shaped and more or less symmetrical in continental species (Fig. 2, see also the drawings in Bezděk and Zhang (2006)), while strongly asymmetrical in Taiwanese species (Figs 24–47). Outer longitudinal grooves on pronotum are deeper in Taiwanese species while more feeble in continental species. Aedeagus sclerotized ventrally in Taiwanese species, but membranous in continental species. Internal sclerite divergent apically in almost all Taiwanese species (Figs 19, 53, 66, 86), while the continental *S. rufa* has the sclerite divergent basally (Fig. 3). On the other hand, the structure of the spermatheca, gonocoxae, ventrite VIII and extended internal part of male abdominal ventrite V in the male are very similar (these structures of *S. rufa* as in Figs 5–8, and for the other Taiwanese species as in Figs 21–23, 48, 49, 55–57, 68–70, 81–83).

Biology. Taiwanese species of *Sikkimia* appear to be univoltine, based on field observations. Larvae are nocturnal and found on the underside of the host plant's leaves

Figures 1–2. *Sikkimia rufa* (Chen). **1** Male, dorsal view **2** Three apical antennomeres of right antenna, ventral view.

between February and April. Larval development takes about 20–22 days, based on laboratory rearing. Mature larvae leave the host plant and burrow into the soil where they build underground chambers for pupation. The pupal stage lasts for 22 days, and adults begin to emerge after April. The adults are also nocturnal and live for more than



Figures 3–8. *Sikkimia rufa* (Chen). **3** Aedeagus, dorsal view **4** Aedeagus, lateral view **5** Apices of gonocoxae **6** Eigth abdominal ventrite **7** Male abdominal ventrites III–V **8** Spermatheca.

three months, a lengthy longevity for chrysomelids. Females deposited single eggs on leaves under laboratory conditions, but these failed to hatch. Presumably *Sikkimia* species overwinter as adults, as some females were collected during winter.

Figures 9–16. Field photography. **9** Larva of *Sikkimia sufangae* sp. n. feeding on *Polygonum chinense* **10** Larva of *S. tsoui* sp. n. feeding on *Rubus corchorifolius* **11** Larva of *S. tsoui* sp. n. feeding on *Dumasia miaoliensis* subsp. *bicolor* **12** Larva of *Gallerucida singularis* feeding on *P. chinense* **13** Female of *S. tsoui* sp. n. feeding on stem of *R. corchorifolius* **14** Female of *S. sufangae* sp. n. **15** Male of *S. tsoui* sp. n. feeding on leaves of *R. swinhoei* **16** Female of *S. sufangae* sp. n. feeding on flowers of *P. posumbu*.

All known *Sikkimia* species feed on the leaves of *P. chinense* L. (Polygonaceae) (Fig. 9). However, some populations of *S. tsoui* sp. n. also feed on other plants in different areas. For example, populations from Yangminshan National Park (including Hsiaoyuken, Erhtzuping, Lengshuiken, Tatunshan) have been observed feeding on *R. swinhoei* (Fig. 15) and *R. corchorifolius* (Fig. 10) (Rosaceae), and members of populations from Tahunshan feed on *Dumasia miaoliensis* subsp. *bicolor* (Fig. 11) (Fabaceae). Specimens from these populations will feed on *P. chinense* if switched from their original host plant.

In Taiwan, leaf beetles from three genera are known to feed on *P. chinense*. These include *Altica birmanensis* (Jacoby, 1896) (Lee and Cheng 2007), *Gallerucida singularis* Harold, 1880 (Lee and Bezděk 2013), and *Sikkimia* species. *Altica birmanensis* inhabits lowlands, at elevations below 1200 m. *Gallerucida singularis* occurs at slightly higher elevations, ranging between 1000 m and 1500 m. *Sikkimia* species occupy the higher elevations, and are found from 1000 m to 2500 m in central and southern Taiwan. Thus *G. singularis* is sympatric with *Sikkimia* species in some areas. Although members of both taxa are nocturnal, their larvae prefer different sites on the host plant. Larvae of *G. singularis* always appear on the upper surface of leaves, their body segments lack lateral expansions, and the apical posterior tergites are narrower (Fig. 12). *Sikkimia* larvae occur on the underside of leaves, each body segment has lateral expansions, and the apical posterior tergites are wider (Figs 9–11).

Distribution. China, India (Sikkim), Laos, Myanmar, Taiwan, and Vietnam.

Revision of Taiwanese *Sikkimia*

Sikkimia babai (Kimoto, 1989), comb. n.

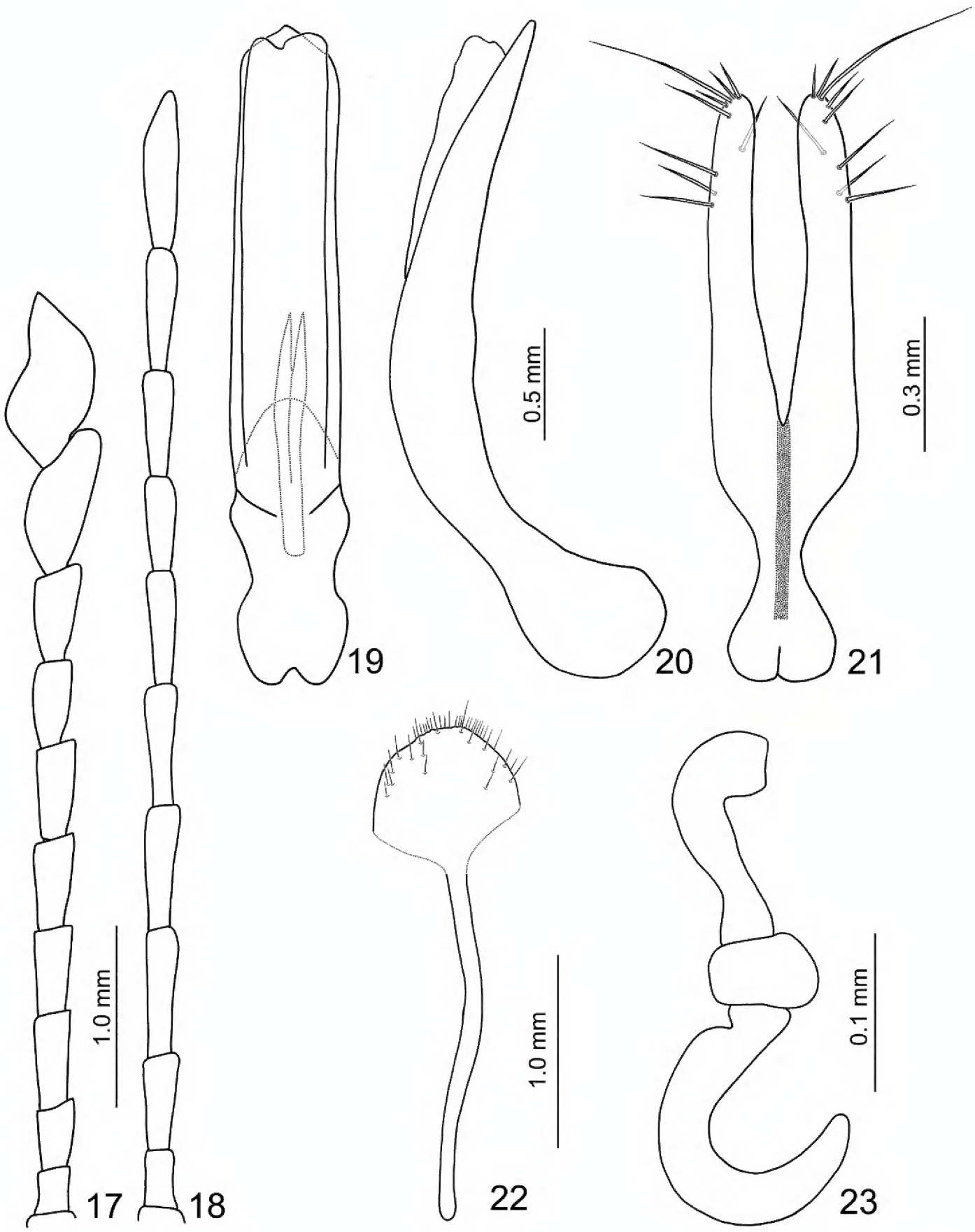
Taiwanolepta babai Kimoto, 1989: 74.

Type locality. Taiwan: Kaoshiung county, Shinanshan (溪南山), 23°05'36"N, 120°48'18"E, 2600 m.

Type material. Deposition of type specimens (holotype and one paratype) was not indicated by the original paper. The paratype ♂was found at the KMNH, labeled: "Thu Yun Shan [出雲山], near Liu Kui [六龜], S-Taiwan 23.VII.1986 Col. K Baba / *Taiwanolepta babai* n. sp. Det. S. Kimoto, 1989 / PARATYPE (printed on blue paper) / PHOTO (printed on red paper)".

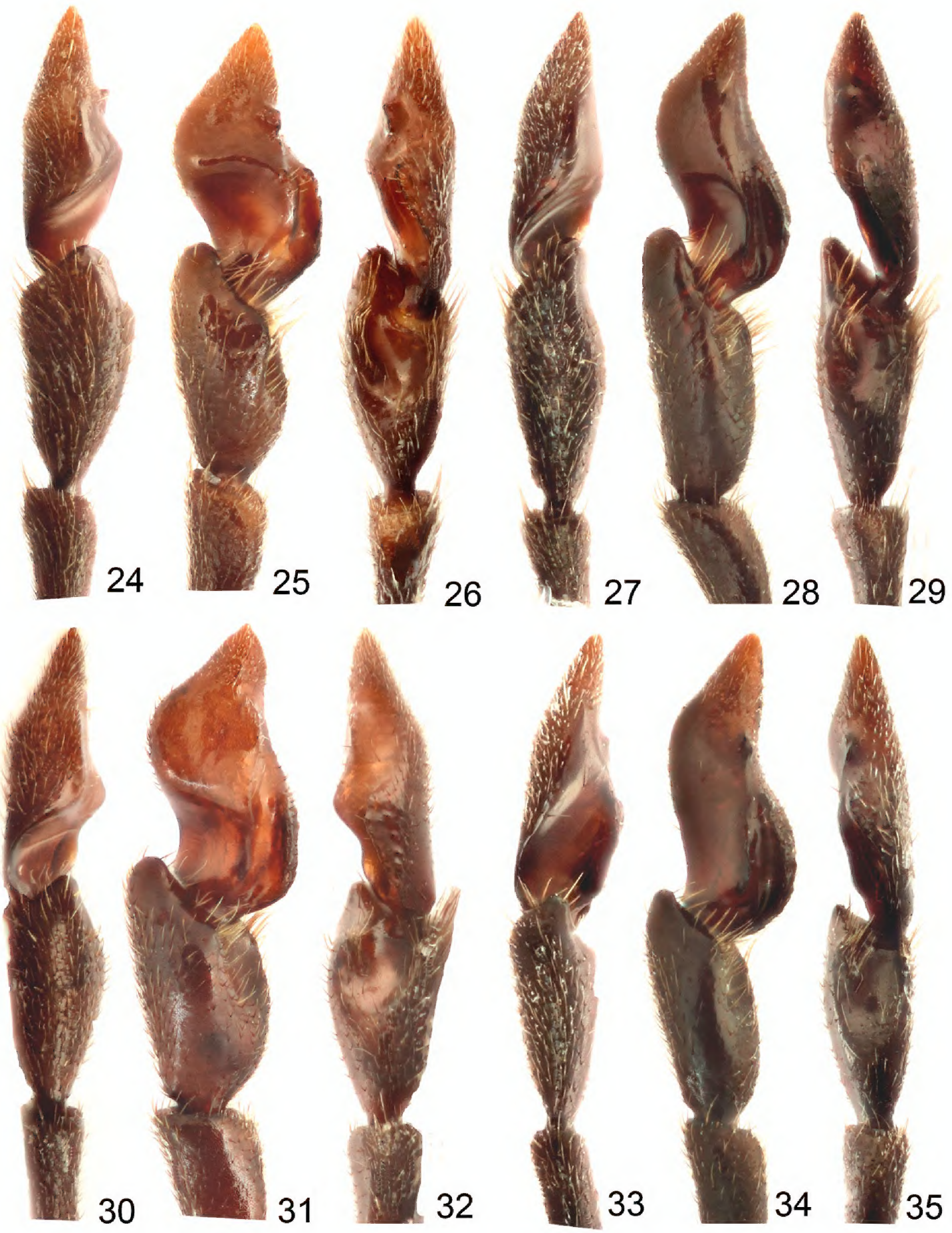
Other material examined (n= 18). **Kaoshiung:** 7♂♂, 7♀♀, Tengchi (藤枝), 23°04'02"N, 120°45'21"E, 2.VI.2008, leg. C.-F. Lee (2 spec. in JBCB); 1♂, same locality, 26.V.2009, leg. C.-F. Lee; 1♀, Shihshan logging trail (石山林道, =Tengchi), 1.X.2008, leg. M.-H. Tsao; 1♂, 3♀♀, same locality, 2.X.2008, leg. M.-H. Tsou.

Description. ***Male.*** Length 7.1–7.5 mm; width 3.9–4.1 mm. Coloration reddish-brown, head dark brown, legs and antennae black. Antenna (Fig. 17) elongate, about as long as body; antennomeres I to VIII filiform; IX widening slightly towards apex; × and XI extremely swollen (Figs 24–26, 36–38), × with a deep groove, from middle to apex,



Figures 17–23. *Sikkimia babai* (Kimoto). **17** Antenna, male **18** Antenna, female **19** Aedeagus, dorsal view **20** Aedeagus, lateral view **21** Gonocoxae **22** Eighth abdominal ventrite **23** Spermatheca.

of mesal surface; apex of XI pointed, weakly concave in apical 1/3 of mesal surface and in basal 1/4 of outer surface; dorsal surface with two longitudinal ridges, one centrally located, curved, from middle to basal 1/5; other longitudinal ridge along mesal surface from middle to basal 1/4; one deep groove between the two longitudinal ridges; one transverse groove near base; small process at apical 1/3 near outer margin; length ratios



Figures 24–35. Photographs of male antennomeres X–XI. **24** *S. babai* (Kimoto), outer view **25** Ventral view **26** Inner view **27** *S. meihuai* sp. n., outer view **28** Ventral view **29** Inner view **30** *S. sufangae* sp. n., outer view **31** Ventral view **32** Inner view **33** *S. yuae* sp. n., outer view **34** Ventral view **35** Ditto, inner view.

of antennomeres II to XI about 1.0 : 1.2 : 2.0 : 1.9 : 1.9 : 1.9 : 1.7 : 1.9 : 3.2 : 3.5, and length to width ratios of antennomeres II to XI about 1.4 : 1.5 : 2.4 : 2.1 : 2.1 : 2.3 : 2.2 : 1.8 : 2.4 : 2.0. Pronotum transverse, 1.7 × wider than long; anterior and posterior mar-

gins almost straight; lateral margins weakly rounded or straight; disc finely punctured. Elytra narrow, about 1.3 × longer than wide; densely and randomly punctuate, humeri reduced. Abdominal ventrite V (Fig. 48) trilobed, internal anterior margin extended, reaching ventrite III; median longitudinal, internal ridge running from base to apex of extension. Abdominal tergite I with only spiracles sclerotized; tergites II–V with sclerotized spiracles and transverse weakly sclerotized areas; most of tergite VI and spiracles strongly sclerotized; tergite VII entirely and strongly sclerotized. Aedeagus (Figs 19–20) narrow in dorsal view, about 6.2× longer than wide, parallel-sided in basal 1/3, becoming slightly narrower towards apex; apex subtriangular and pointed; ventral surface well sclerotized and smooth; narrow and moderately curved in lateral view; endophallic sclerite longitudinal and slender, bifurcate apically, about 0.3 × as long as aedeagus.

Female. Length 8.1–8.4 mm; width 5.3–5.8 mm. Similar to males, but dark brown ventrally; antennae (Fig. 18) filiform, antennomeres × and XI not swollen; length ratio of II to XI about 1.0 : 1.7 : 2.2 : 2.2 : 2.2 : 2.0 : 1.8 : 1.9 : 2.2 : 2.8, and length to width ratios of II to XI about 1.9 : 2.4 : 3.4 : 3.6 : 3.8 : 3.6 : 3.2 : 3.3 : 3.7 : 4.4. Elytra wider than in male, length equal to width. Gonocoxae (Fig. 21) slender, together about 4.0 × longer than wide, joined from base almost to middle, base strongly narrowed in basal 1/3 with a long medial groove, apices tubular and sub-parallel, inner margins slightly indented medially, apex with nine setae. Ventrite VIII (Fig. 22) with extremely long spiculum; apical margin widely rounded, weakly sclerotized basally, disc with long scattered setae along apical margin. Abdominal tergites I–III membranous, only spiracles sclerotized, tergites IV–VII entirely and strongly sclerotized. Receptacle of spermatheca (Fig. 23) strongly swollen and transverse, pump elongate and moderately curved, proximal spermathecal duct long and wide.

Diagnosis. *Sikkimia babai* is similar to *S. sufangae* sp. n. They share a slender aedeagus (more than 5.9× longer than wide), but in *S. babai* it is parallel-sided (aedeagus wider basally in *S. sufangae* sp. n. (Fig. 66, 67)). Antennomere XI in male *S. babai* has one process on the inner antero-lateral surface and the outer antero-lateral surface is flat (process absent on inner antero-lateral surface and outer antero-lateral surface depressed in *S. sufangae* sp. n.). The gonoxae are sub-parallel in *S. babai* (diverging in *S. sufangae* sp. n.).

Host plant. *Polygonum chinense* L. (Polygonaceae).

Distribution. Tengchi (Kaoshiung county) (Fig. 50) and its surrounding areas.

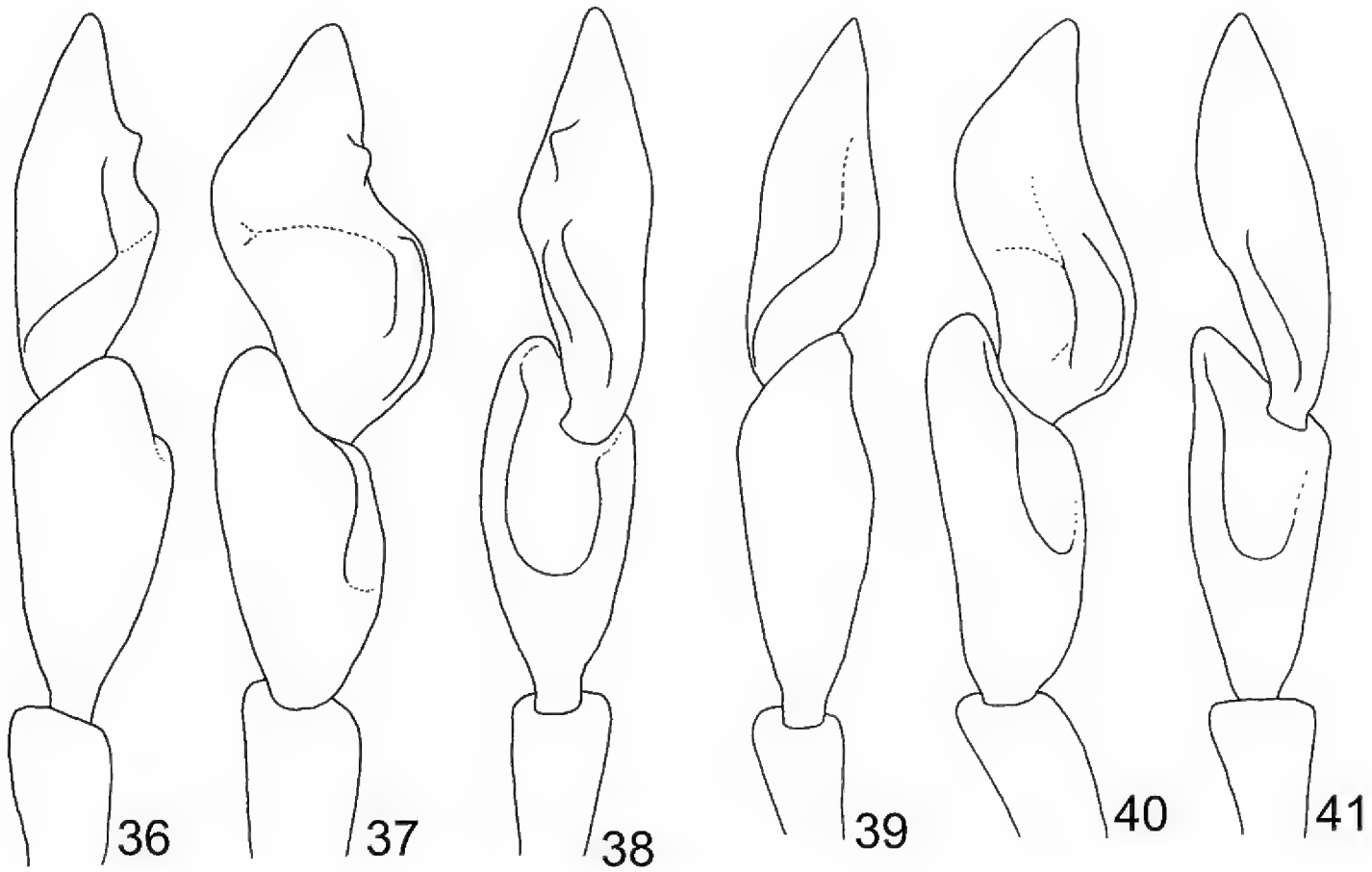
Sikkimia meihuai sp. n.

http://zoobank.org/DD3EE7B6-4DD2-4CD7-AAF7-F2FCD115C6CC

Figs 27–29, 39–41, 50–57

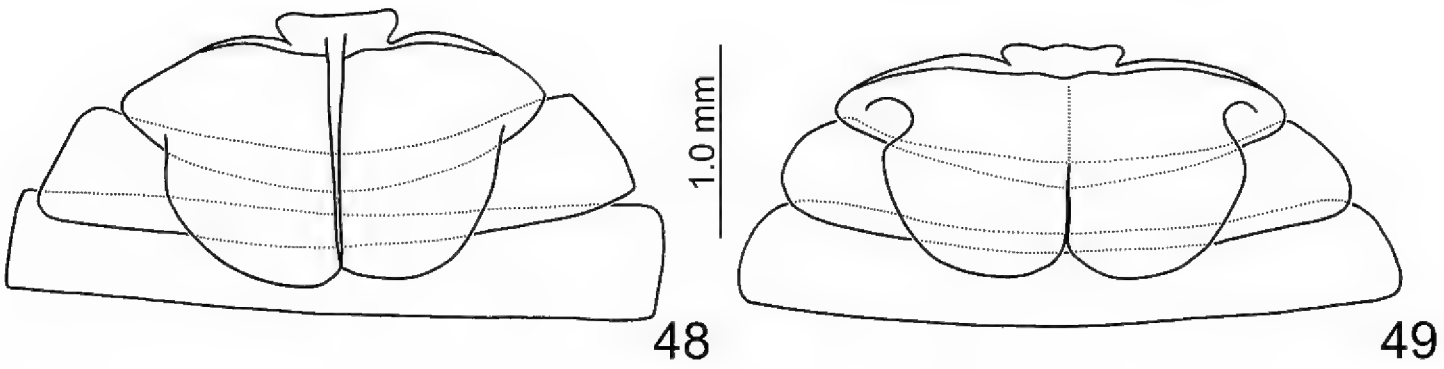
Type locality. Taiwan: Taitung county, Liyuan (栗園), 23°13'17"N, 121°00'40"E, 1800 m.

Type material (n= 19). Holotype ♂: **Taitung:** Liyuan (栗園), 23.VI.2010, leg. M.-H. Tsou. Paratypes: 3♂♂, 2♀♀, same data as holotype; 2♀♀, same locality,



Figures 36–47. Illustrations of male antennomeres X–XI. **36** *S. babai* (Kimoto), outer view **37** Ventral view **38** Inner view **39** *S. meihuai* sp. n., outer view **40** Ventral view **41** Inner view **42** *S. sufangae* sp. n., outer view **43** Ventral view **44** Inner view **45** *S. yuae* sp. n., outer view **46** Ventral view **47** Inner view.

19.VI.2013, leg. C.-F. Lee; 7♀♀, same locality, 24.VII.2013, leg. C.-F. Lee; 1♂, 3♀♀, Motien (摩天), 23°11'41"N, 121°01'18"E, 20.VI.2011, leg. C.-F. Lee (1♂, 2♀♀ in JBCB).



Figures 48–49. Male abdominal ventrites III–V, dorsal view. **48** *Sikkimia babai* **49** *S. tsoui* sp. n.

Description. ***Male.*** Length 7.3–7.5 mm; width 4.0–4.2 mm. Coloration brown, head dark brown, legs and antennae black. Antenna (Fig. 51) long, about as long as body; antennomeres I–VII filiform; VIII-IX widening slightly;× and XI extremely swollen (Figs 27–29, 39–41),× with a shallow groove from middle to apex of mesal surface, XI moderately concave in basal 1/4 of outer surface, weakly concave in apical 1/3 of mesal surface and pointed apically; dorsal surface with two longitudinal ridges, one close to mesal margin, extending from middle and abbreviated near base, other longitudinal ridge along mesal margin extending from apical 1/3, projecting in middle, and ending in basal 1/4, with a deep groove between the longitudinal ridges, and a transverse groove near the base; length ratio of II to XI about 1.0 : 1.3 : 1.8 : 1.6 : 1.8 : 1.6 : 1.4 : 1.3 : 1.8 : 2.8, and length to width ratios of II to XI about 2.0 : 2.0 : 2.7 : 2.4 : 2.7 : 2.2 : 2.3 : 1.9 : 2.8 : 2.8. Pronotum transverse, 1.5× as wider than long; anterior and posterior margins almost straight, slightly concave medially; lateral margin weakly rounded; disc with finely punctured. Elytra narrow, about 1.2× longer than wide; densely and randomly punctuate, humeri reduced. Abdominal ventrite V trilobed, internal anterior margin extended, reaching ventrite III; median longitudinal internal ridge running from base to apex of extension. Abdominal tergite I with only spiracles sclerotized; tergites II–V with sclerotized spiracles and transverse weakly sclerotized areas; most of tergite VI and spiracles strongly sclerotized; tergite VII entirely and strongly sclerotized. Aedeagus (Figs 53–54) wide in dorsal view, about 4.8× longer than wide, base strongly incised medially, wide in basal 1/3, becoming slightly narrower towards the subtriangular apex; ventral surface well sclerotized and smooth; broad and moderately curved in lateral view; endophallic sclerite longitudinal and slender, bifurcate apically, about 0.3× as long as aedeagus.

Female. Length 7.5–8.2 mm; width 4.5–4.8 mm. Similar to male, but antennae (Fig. 52) filiform, antennomeres× and XI not swollen; length ratio of II to XI about 1.0 : 1.6 : 2.1 : 2.0 : 2.1 : 2.0 : 1.8 : 1.9 : 2.1 : 2.6, and length to width ratios of II to XI about 1.9 : 2.6 : 3.3 : 3.1 : 3.3 : 3.2 : 2.9 : 3.0 : 3.3 : 4.2. Elytra relatively wide, about 1.1× longer than wide. Gonocoxae (Fig. 55) wide, together about 2.7× longer than wide and joined from base almost to middle, basal margin deeply indented medially narrowing strongly in basal 1/3 with a short medial groove, apices tubular and parallel, narrowing slightly in apical 1/3 and curving inward, with nine setae. Ventrite VIII (Fig. 56) weakly sclerotized; with extremely long speculum; apex transverse, api-

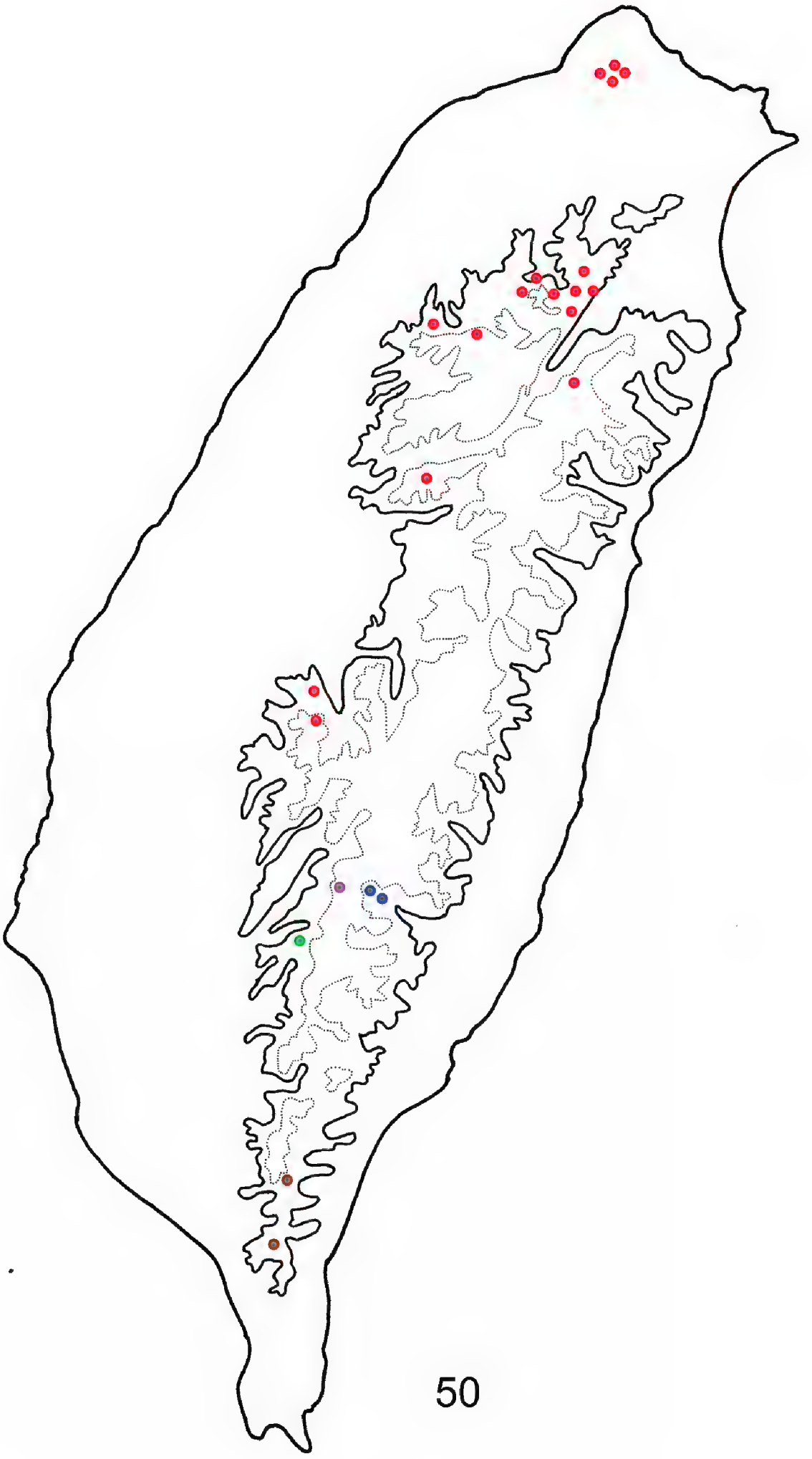
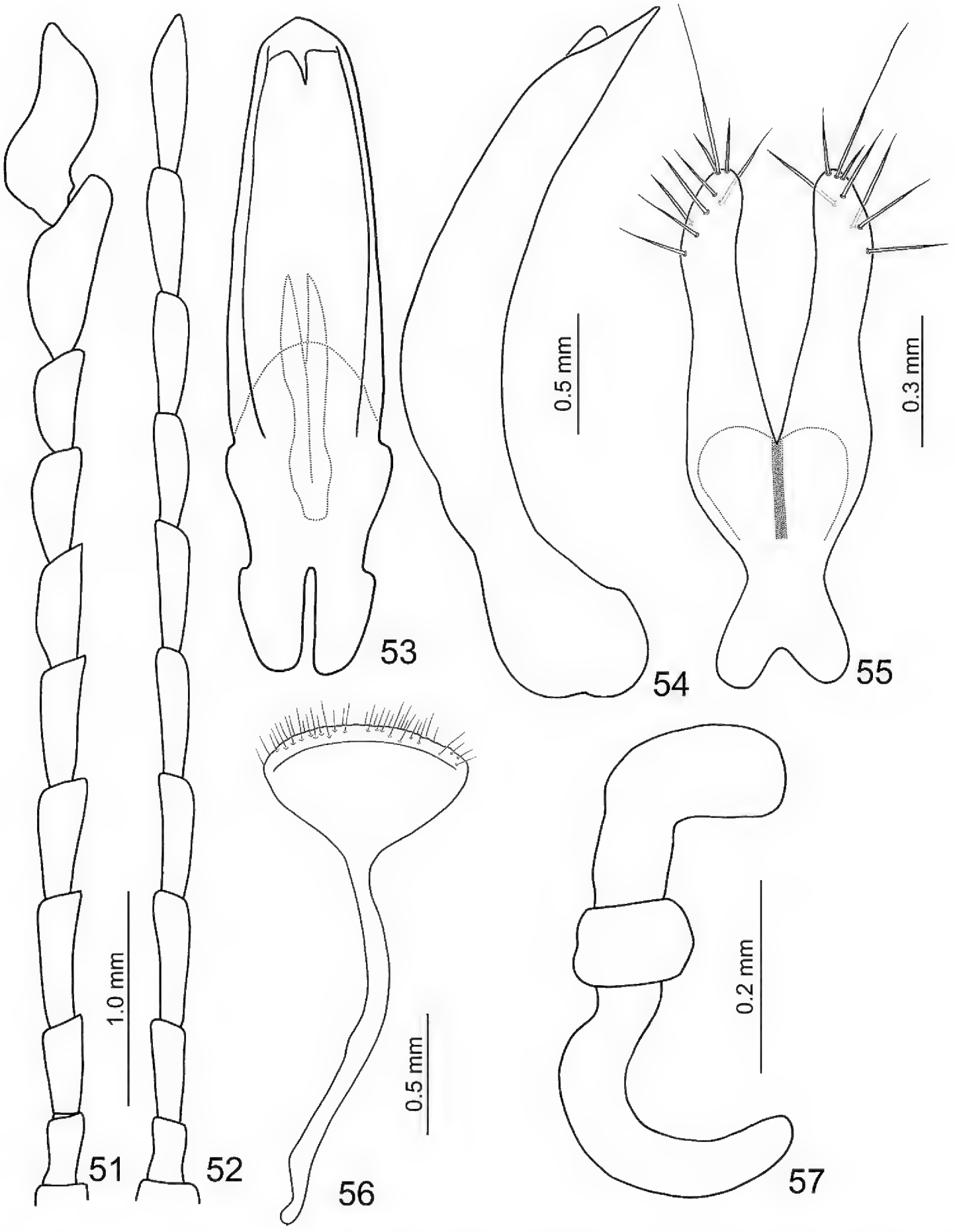


Figure 50. Distribution map of *Sikkimia* species of Taiwan, solid line: 1000 m, broken line: 2000 m. Brown dots: *S. sufangae* sp. n., green dots: *S. babai*, pink dots: *S. yuae* sp. n., red dots: *S. tsoui* sp. n., blue dots: *S. meihuai* sp. n.



Figures 51–57. *Sikkimia meihuai* sp. n. **51** Antenna, male **52** Antenna, female **53** Aedeagus, dorsal view **54** Aedeagus, lateral view **55** Gonocoxae **56** Eighth abdominal ventrite **57** Spermatheca.

cal margin widely rounded, with scattered long setae along apical margin. Abdominal tergites I–III membranous with only spiracles sclerotized, tergites IV–VII entirely and strongly sclerotized. Receptacle of spermatheca (Fig. 57) strongly swollen and transverse; pump elongate and strongly curved; spermathecal duct short but extremely wide.

Diagnosis. *Sikkimia meihuai* sp. n. is similar to *S. yuae* sp. n. in greatest width of the aedeagus (4.8× longer than wide), but differs in having the aedeagus narrowing very slightly towards the apex (distinctly narrower in apical 1/3 in *S. yuae* sp. n.); short median ridge on antennomere IX in males (long median ridge in *S. yuae* sp. n.); and wider gonocoxae, 2.7× longer than wide (slender gonocoxae in *S. yuae* sp. n., 4.4× longer than wide).

Host plant. *Polygonum chinense* L. (Polygonaceae).

Etymology. This new species is named after Mr. Mei-Hua Tsou, who is a member of TCRT and the first to collect this new species.

Distribution. East half of South Cross-Island Highway (南橫公路) (Fig. 50).

***Sikkimia sufangae* sp. n.**

http://zoobank.org/9AD84610-CAB7-4517-934E-689E4A8F3393

Figs 9, 14, 16, 30–32, 42–44, 50, 58–70

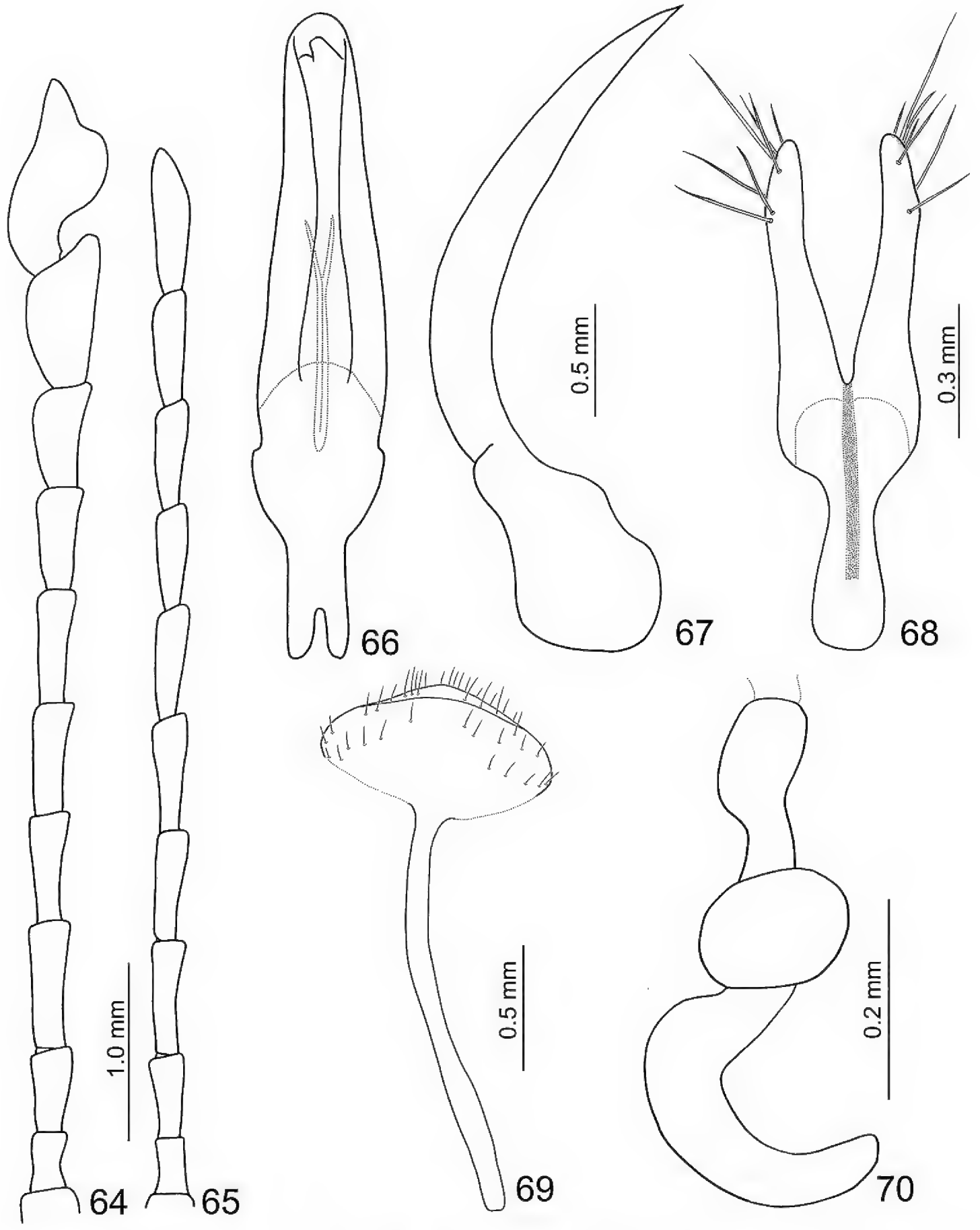
Type locality. Taiwan: Pingtung county, Tahanshan (大漢山), 22°24'27"N, 120°45'23"E, 1400 m.

Type material (n= 75). Holotype ♂: **Pingtung:** Tahanshan (大漢山), 6.VI.2012, leg. C.-F. Lee. Paratypes: 5♂♂, 9♀♀, same data as holotype (2♂♂, 2♀♀ in JBCB); 1♂, same locality, 18.VII.2007, leg. C.-F. Lee; 1♂, 1♀, same locality, 22.I.2009; leg. S.-F. Yu; 1♂, same locality, 25.V.2009, leg. M.-L. Jeng; 1♀, same locality, 21.I.2012, leg. S.-F. Yu; 1♀, same locality, 19.VII.2012, leg. C.-F. Lee; 2♂♂, same locality, 29.IV.2013, leg. Y.-T. Chung; 1♂, same locality, 2.VI.2013, leg. J. Yamasako (EUMJ); 1♀, same locality, 29.VI.2013, leg. B.-X. Guo; 3♀♀, same locality, 8.VII.2013, leg. B.-X. Guo; 3♀♀, same locality, 11.VII.2013, leg. B.-X. Guo; 1♀, same locality, 12.VII.2013, leg. Y.-T. Chung; 1♀, same locality, 19.VII.2013, leg. M.-H. Tsou; 1♀, 28.VIII.2014, leg. Y.-T. Chung; 3♀♀, 4.X.2014, leg. Y.-T. Chung; 8♂♂, 1♀, same locality, 1.V.2015, leg. Guo & Chung; 1♂, same locality, 19.V.2015, leg. Y.-T. Chung; 3♂♂, same locality, 27.V.2015, leg. Y.-T. Chung; 1♂, same locality, 29.V.2015, leg. Y.-T. Chung; 4♂♂, 3♀♀, same locality, 6.VI.2015, leg. Y.-T. Chung; 3♂♂, Peitawushan (北大武山), 22°37'47"N, 120°45'41"E, 22.IV.2015, leg. J.-C. Chen; 7♂♂, 7♀♀, same locality, 24.IV.2015, leg. J.-C. Chen.

Description. ***Male.*** Length 7.8–9.0 mm; width 4.0–4.3 mm. Coloration (Figs 58–60) brown, head dark brown, legs and antennae black. Antenna (Fig. 64) long, about as long as body; antennomeres I to VII filiform; VIII and IX widening slightly;× and XI (Figs 30–32, 42–44) extremely swollen,× with shallow groove from middle to apex of mesal surface; apex of XI pointed, moderately concave in basal 1/4 of outer surface and in apical 1/3 of mesal surface, dorsal surface with two longitudinal ridges, one close to mesal margin, from base to near middle, strongly curved; other longitudinal ridge along mesal margin extending from basal ¼ to apical 1/3, projecting medially, with a deep groove between the longitudinal ridges, and a transverse groove near the base, shallowly depressed on outer antero-lateral surface; length ratio of II to XI about 1.0 : 1.4 : 1.8 : 2.2

Figures 58–63. Habitus of *Sikkimia sufangae* sp. n. **58** Male, dorsal view **59** Male, ventral view **60** Male, lateral view **61** Female, dorsal view **62** Female, ventral view **63** Female, lateral view.

: 2.0 : 1.9 : 2.1 : 1.9 : 1.8 : 2.8, and length to width ratios of II to XI about 1.6 : 1.9 : 2.9 : 2.7 : 2.6 : 2.8 : 2.8 : 2.5 : 1.9 : 2.2. Pronotum transverse, 1.5× wider than long; anterior and posterior margins almost straight; lateral margin weakly rounded; disc with small punctures. Elytra narrow, about 1.4× longer than wide; densely and randomly punctuate, humeri reduced. Abdominal ventrite V trilobed, internal anterior margin extended, reaching ventrite III; median longitudinal, internal ridge running from base to apex of extension. Abdominal tergite I with only spiracles sclerotized; tergites II-V with sclerotized spiracles and transverse weakly sclerotized areas; most of tergite VI and spiracles strongly sclerotized; tergite VII entirely and strongly sclerotized. Aedeagus (Figs 66–67)



Figures 64–70. *Sikkimia sufangae* sp. n. **64** Antenna, male **65** Antenna, female **66** Aedeagus, dorsal view **67** Aedeagus, lateral view **68** Gonocoxae **69** Eighth abdominal ventrite **70** Spermatheca.

slender, about 5.9× longer than wide, base moderately incised medially, basal 1/3 wide, narrowing considerably towards the rounded apex, ventral surface well sclerotized and smooth; moderately curved in lateral view; endophallic sclerite longitudinal and extremely slender, bifurcate apically, about 0.3× as long as aedeagus.

Female. Length 7.8–8.1 mm; width 5.2–5.3 mm. Similar to males (Figs 61–63), but antennae filiform (Fig. 65), antennomeres× and XI not swollen; length ratio of II to XI about 1.0 : 1.5 : 2.0 : 1.9 : 2.0 : 1.9 : 1.8 : 1.9 : 2.0 : 2.6, and length to width ratios of II to XI about 1.9 : 2.3 : 3.3 : 3.2 : 3.4 : 3.1 : 3.0 : 3.1 : 3.4 : 4.0. Elytra as wide as long. Gonocoxae (Fig. 68) slender, about 3.6× longer than wide, joined from base to middle, base rounded, strongly narrowed in basal 1/3, apices tubular curved slightly inwards, diverging, apex with seven or eight setae. Ventrite VIII (Fig. 69) weakly sclerotized; apex extremely transverse, apical margin widely rounded, disc with long scattered long setae towards apex. Abdominal tergites I–III membranous with only the spiracles sclerotized, IV–VII entirely and strongly sclerotized. Receptacle of spermatheca (Fig. 70) strongly swollen and transverse, pump long and strongly curved; proximal spermathecal duct short and swollen distally.

Diagnosis. *Sikkimia sufangae* is similar to *S. babai*. See diagnosis of *S. babai* for a summary of the differentiating characteristics of these two species.

Host plant. *Polygonum chinense* L.; *P. posumbu* Buch.-Ham. ex Don (Polygonaceae) (Fig. 16).

Etymology. This new species is named after Mrs. Su-Fang Yu, who is a member of TCRT and the first to collect this new species.

Distribution. Southern Taiwan (Fig. 50).

***Sikkimia tsoui* sp. n.**

http://zoobank.org/385E17EE-64F8-4B24-AF8B-E7D2C948731C

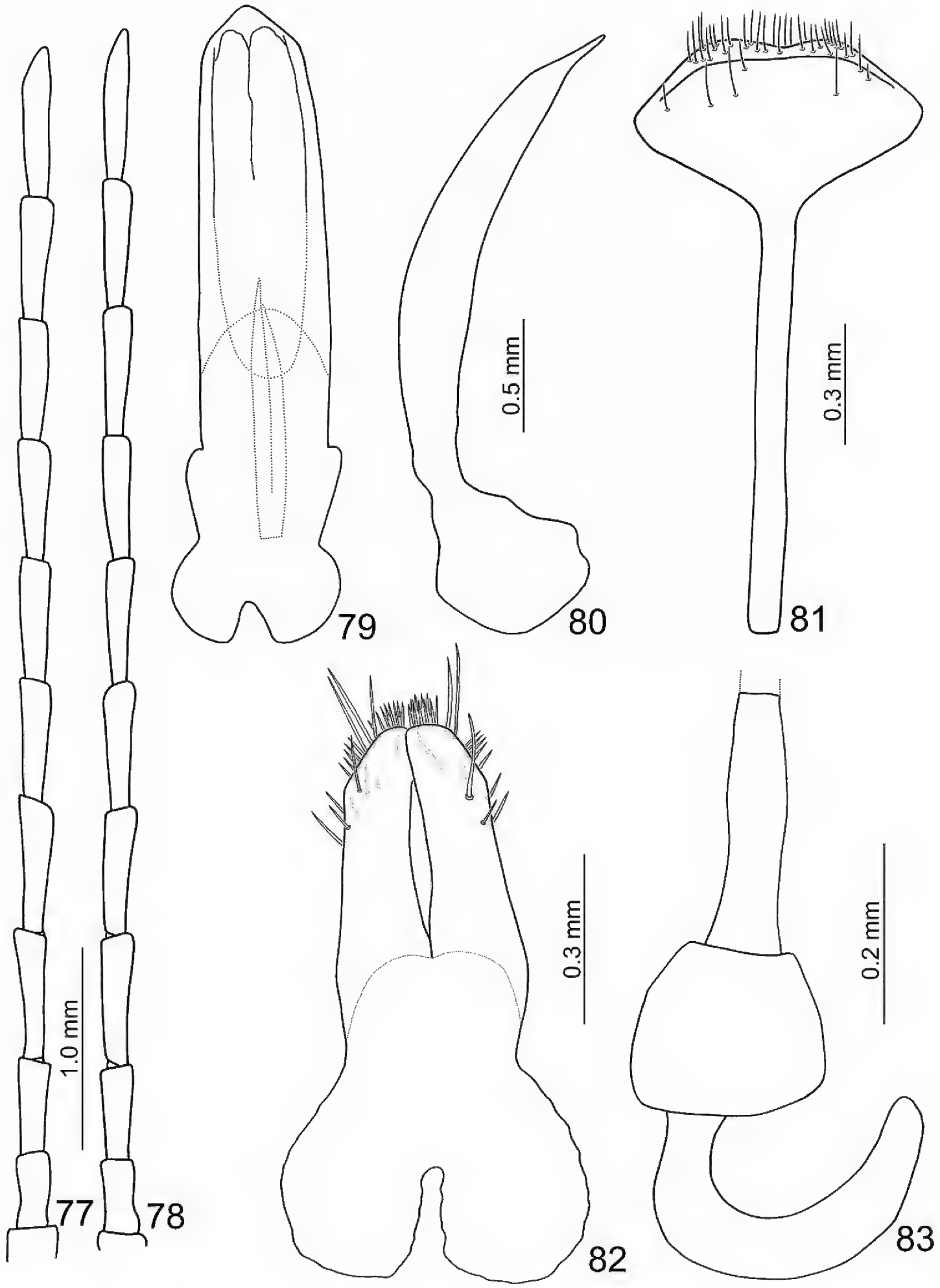
Figs 10, 11, 13, 15, 49, 50, 71–83

Type locality. Taiwan: Taipei city, Hsiaoyuken (小油坑), 25°10'38"N, 121°32'50"E, 800 m.

Type material (n= 229). Holotype ♂: **Taipei:** Hsiaoyuken (小油坑), 22.VI.2008, leg. M.-H. Tsou. Paratypes: 1♀, same as holotype; 1♂, same locality, 21.IV.2008, leg. M.-H. Tsou; 2♂♂, same locality, 24.IV.2008, leg. M.-H. Tsou; 6♀♀, same locality, 22.VI.2008, leg. S.-F. Yu; 1♂, same locality, 24.V.2008, leg. M.-H. Tsou; 1♂, 3♀♀, same locality, 5.IV.2009, leg. M.-H. Tsou; 8♂♂, 13♀♀, same locality, 8.V.2010, leg. M.-H. Tsou; 2♂♂, 8♀♀, same locality, 15.V.2011, leg. M.-H. Tsou; 1♀, Erhtzuping (二子坪), 25°11'01"N, 121°31'07"E, 14.VIII.2011, leg. M.-H. Tsou; 7♂♂, 4♀♀, same locality, 3.VI.2011, leg. M.-H. Tsou; 2♀♀, Lengshuiken (冷水坑), 25°10'03"N, 121°33'46"E, 07.IV.2009, leg. H. Lee; 1♂, same locality, 08.IV.2009, leg. H. Lee; 1♀, Tatunshan (大屯山), 25°11'12"N, 121°31'22"E, 22.V.2010, leg. M.-H. Tsou; **Hsinchu:** 1♀, Lupi (魯壁), 24°39'56"N, 121°16'47"E, 19.VII.2008, leg. M.-H. Tsou; 1♂, 2♀♀, Mamei (馬美), 24°40'13"N, 121°19'13"E, 10.VII.2010, leg. M.-H. Tsou; 1♂, Tahunshan (大混山), 24°41'20"N, 121°16'29"E, 08.IV.2009, leg. M.-H. Tsou; 1♂, same locality, 11.IV.2009, leg. M.-H. Tsou; 1♀, same locality, 13.IV.2009, leg. M.-H. Tsou; 1♂, Talu logging trail (大鹿林道), 24°32'06"N, 121°07'01"E, 1.VIII.2015, leg. Y.-L. Lin; **Ilan:** 1♀, Mingchi (明池), 24°39'01"N, 121°28'22"E,

Figures 71–76. Habitus of *Sikkimia tsoui* sp. n. **71** Male, dorsal view **72** Male, ventral view **73** Male, lateral view **74** Female, dorsal view **75** Female, ventral view **76** Female, lateral view.

2.VII.2008, leg. H.-J. Chen; 1♂, Taipingshan (太平山), 24°29'53"N, 121°32'06"E, 5.VIII.2015, leg. Y.-T. Chung; 16♀♀, Yuanyanghu (鴛鴦湖), 24°34'36"N, 121°24'09"E, 22.VIII.2011, leg. C.-F. Lee; 10♂♂, 5♀♀, same locality, 22.VIII.2011, leg. M.-H. Tsou (2♂♂, 2♀♀ in JBCB); 15♂♂, 5♀♀, same locality, 22.VIII.2011, leg. H. Lee; 3♂♂, Tatung (大同, = Yuanyanghu), 19.VIII.2010, leg. H.-H. Lee; **Miaoli:** 1♂, Luchang (鹿場), 24°32'26"N, 121°01'38"E, 1.VI.2014, leg. Y.-M. Weng; **Nantou:** 15♂♂, 35♀♀, Hsitou (溪頭), 23°40'20"N, 120°47'53"E, 14.VI.2011, leg. C.-F. Lee; 10♂♂, 7♀♀, same locality, 9.VIII.2011, leg. M.-H. Tsou; 1♂, Shanlinhsi (



Figures 77–83. *Sikkimia tsoui* sp. n. **77** Antenna, male **78** Antenna, female **79** Aedeagus, dorsal view **80** Aedeagus, lateral view **81** Eighth abdominal ventrite **82** Gonocoxae **83** Spermatheca.

杉林溪), 23°38'22"N, 120°47'32"E, 10.IX.2009, leg. Y.-T. Wang; 2♂♂, 3♀♀, same locality, 12.VIII.2015, leg. S.-P. Wu; **Taichung:** 7♂♂, 7♀♀, Anmashan (鞍馬山), 24°14'41"N, 120°58'30"E, 19.X.2011, leg. C.-F. Lee; 2♂♂, Tahsuehshan (大雪山, = Anmashan), 7.VI.2010, leg. C.-F. Lee; 2♀♀, same locality, 4.VI.2012, leg. J.-C. Chen; **Taoyuan:** 1♂, Hsuanyuan (萱源), 24°39'11"N, 121°24'17"E, 13.V.2010, leg. S.-F. Yu; 4♀♀, same locality, 1.VI.2010, leg. W.-T. Liu; 1♂, Lalashan (拉拉山), 24°40'47"N, 121°23'02"E, 20.IV.2008, leg. C.-F. Lee.

Description. ***Male.*** Length 6.1–6.5 mm; width 3.7–3.8 mm. Coloration brown (Figs 71–73), legs and antennae black. Antenna (Fig. 77) long, about long as body; filiform; length ratio of antennomeres II to XI about 1.0 : 1.3 : 1.8 : 1.8 : 1.7 : 1.7 : 1.7 : 1.7 : 1.7 : 2.1 and length to width ratios of II to XI about 2.1 : 2.6 : 3.6 : 3.6 : 4.0 : 4.0 : 4.0 : 4.0 : 4.0 : 4.9. Pronotum transverse, 1.6× wider than long; anterior and posterior margins almost straight; lateral margin weakly rounded; disc with reduced punctures. Elytra wide, about 1.2× longer than wide; densely and randomly punctuate, humeri reduced. Abdominal tergite I membranous with sclerotized spiracles; II-VI with medial transverse patch sclerotized as well as area surrounding spiracles; VII mostly sclerotized, with spiracle inside sclerotized area. Abdominal ventrite V (Fig. 49) trilobed, internal anterior margin extended, reaching ventrite III; median longitudinal, internal ridge extending from base to mid-length of extension. Aedeagus (Figs 79–80) wide in dorsal view, about 4.5× longer than wide, base shallowly incised medially; greatest width in basal 1/3, becoming very slightly narrower towards the subtriangular apex; ventral surface well sclerotized, concave medially; narrow and moderately curved in lateral view; endophallic sclerite longitudinal, slender, joined from base to near apex, about 0.4× as long as aedeagus (Fig. 79).

Female. Length 8.0–8.3 mm; width 4.9–5.7 mm. Similar to male (Figs 74–76). Antenna (Fig. 78) about long as body; filiform; length ratio of antennomeres II to XI about 1.0 : 1.3 : 1.8 : 1.8 : 1.7 : 1.7 : 1.7 : 1.8 : 1.8 : 2.1 and length to width ratios of II to XI about 2.2 : 3.0 : 3.9 : 3.8 : 4.0 : 4.0 : 4.0 : 4.2 : 4.3 : 6.0. Elytra as long as wide, wider than in male. Gonocoxae (Fig. 82) extremely wide, about 2.9× longer than wide, joined from basal 1/5 to middle, with several long and many short dense setae on tubular apices; greatest width at base incised medially, narrowing slightly in basal 1/3 before widening slightly again. Abdominal tergites I and II membranous, only area surrounding of spiracles sclerotized; III with one pair of transverse sclerotized areas near middle; IV with one transverse sclerotized area at middle; V and VI with sclerotized areas larger than on IV; VII mostly sclerotized with spiracles lying inside sclerotized area. Ventrite VIII (Fig. 81) strongly sclerotized; apex transverse, apical margin weakly emarginate, with long dense setae along apical margin. Receptacle of spermatheca (Fig. 83) swollen, pump long and strongly curved, spermathecal duct long and slender.

Variation. Specimens collected from Hsiaoyuken have more robust antennae (length ratio of antennomeres II to XI about 1.0 : 1.5 : 2.2 : 2.1 : 2.2 : 2.1 : 2.1 : 2.2 : 2.3 : 2.7 and length to width ratios of II to XI about 1.6 : 2.4 : 3.2 : 3.4 : 3.5 : 3.3 : 3.3 : 3.7 : 3.7 : 4.3).

Diagnosis. This species is easily distinguished from other Taiwanese species of *Sikkimia* using a combination of the following characters: filiform antennae in males (swollen antennomeres× and XI in other species), reduced median ridge on internal anterior margin extension of abdominal ventrite V (well developed internal median ridge in other species), and the endophallic sclerite of aedeagus that is joined from the base almost to the apex (endophallic sclerite of aedeagus bifurcate apically in other species); abdominal tergites IV-VI largely membranous in female, and gonocoxae much wider with numerous setae on their apices (other species with entirely sclerotized abdominal tergites, slender gonocoxae with few setae on their apices in other species).

Host plant. *Polygonum chinense* L.; *P. thunbergii* Sieb. & Zucc. (Polygonaceae); *Rubus swinhoei* Hance; *R. corchorifolius* L. f. (Rosaceae); *Dumasia miaoliensis* Y. C. Liu & F. Y. Lu subsp. *bicolor* (Hayata) Ohashi & Tateishi (Fabaceae).

Etymology. This new species is named after Mr. Mei-Hua Tsou, who is a member of TCRT and the first to collect this new species.

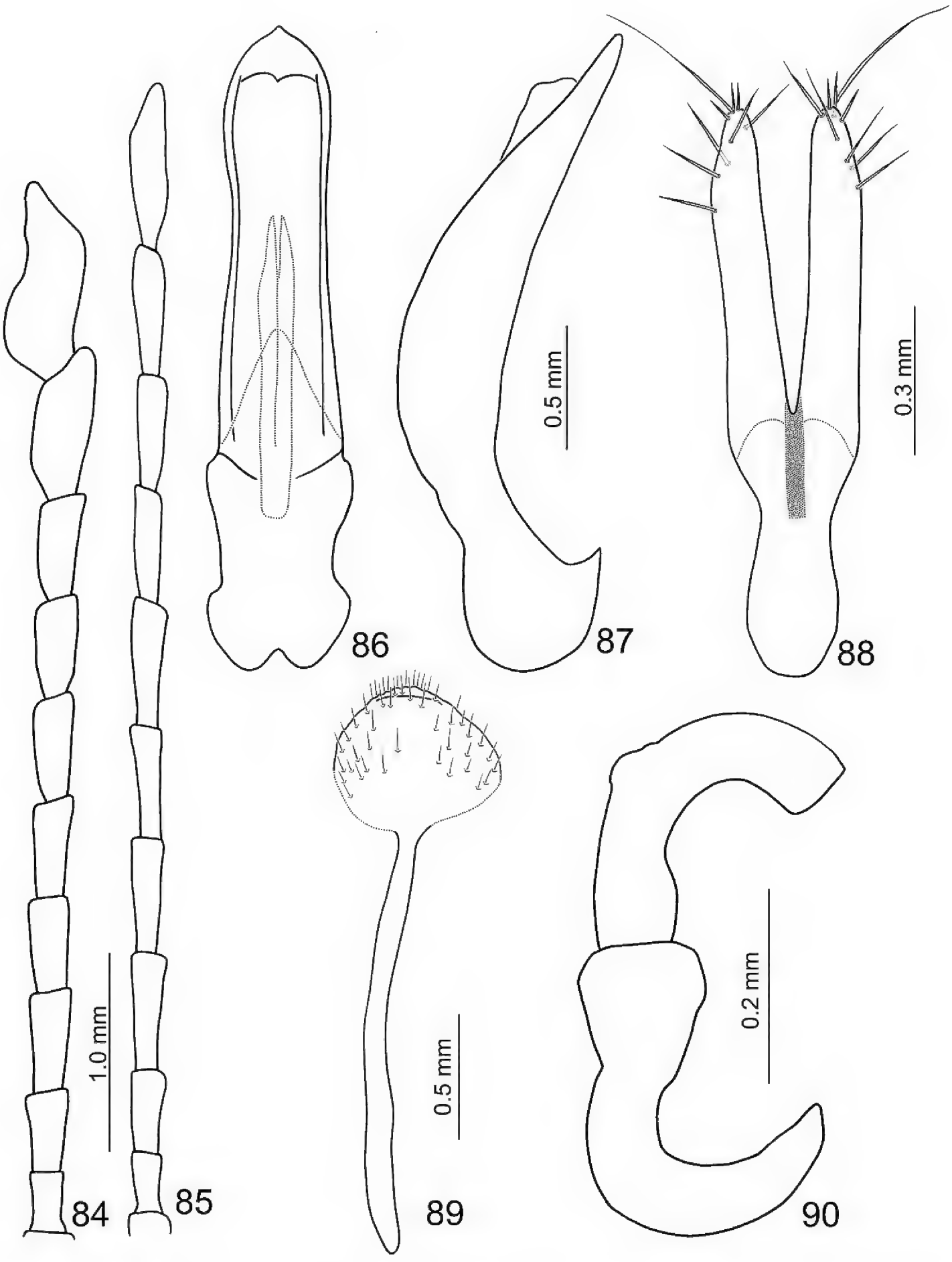
Distribution. North and Central Taiwan (Fig. 50). The distribution extend northwards to Yamingshan National Park (陽明山國家公園) and southwards to Hsitou (溪頭).

***Sikkimia yuae* sp. n.**
http://zoobank.org/288CCEA4-D157-43B8-A523-ED8B454EEDFF
Figs 33–35, 50, 84–90

Type locality. Taiwan: Kaoshiung county, Chungchihkung (中之關), 23°17'10"N, 120°53'51"E, 2300 m.

Type material (n= 16). Holotype ♂: **Kaoshiung:** Chungchihkung (中之關), 10.VI.2015, leg. C.-F. Lee. Paratypes: 5♂♂, 7♀♀, same data as holotype (2♂♂, 2♀♀ in JBCB); 1♂, 2♀♀, Taoyuan (桃源= Chungchihkung), 1.VII.2009, leg. S.-F. Yu.

Description. ***Male.*** Length 7.1–7.5 mm; width 3.9–4.1 mm. Coloration reddish-brown, head dark brown, legs and antennae black. Antenna (Fig. 84) long, about long as body; antennomeres I to VII filiform; VIII and IX slightly widened;× and XI extremely swollen (Figs 33–35, 45–47),× with deep groove from middle to apex of mesal surface, apex of XI pointed, moderately concave in apical 1/3 of mesal surface and in basal 1/4 of outer surface, dorsal surface with two longitudinal ridges, one close to mesal margin extending from basal ¼ to apical 1/3, other longitudinal ridge along mesal margin from basal ¼ to the middle, deep groove between longitudinal ridges, transverse groove near base; length ratio of antennomeres II to XI about 1.0 : 1.3 : 1.5 : 1.5 : 1.6 : 1.6 : 1.5 : 1.6 : 2.5 : 3.1, length to width ratios of antennomeres II to XI about 1.8 : 1.8 : 2.4 : 2.2 : 2.3 : 2.3 : 2.1 : 2.0 : 2.7 : 2.7. Pronotum transverse, 1.6× wider than long; anterior and posterior margins sinuate, weakly concave medially; lateral border-margin weakly rounded; disc with fine scattered punctures. Elytra narrow, about 1.2× longer than wide; punctuate densely, reduced humeri, lateral margin rounded, widest just posterior of the middle. Abdominal ventrite V trilobed, internal anterior margin extended, reaching ventrite III; median longitudinal, internal ridge running from base



Figures 84–90. *Sikkimia yuae* sp. n. **84** Antenna, male **85** Antenna, female **86** Aedeagus, dorsal view **87** Aedeagus, lateral view **88** Gonocoxae **89** Eighth abdominal ventrite **90** Spermatheca.

to apex of extension. Abdominal tergite I with only spiracles sclerotized; II-V with spiracles sclerotized and transverse weakly sclerotized areas; most of VI and spiracles strongly sclerotized; whole of VII strongly sclerotized. Aedeagus (Figs 86–87) wide

in dorsal view, about 4.8× longer than wide, base shallowly incised medially; greatest width in basal 1/3, narrowing slightly towards apical 1/3, widening slightly subapically before the subtriangular apex with a pointed tip; ventral disc well sclerotized and smooth; aedeagus wide and moderately curved in lateral view; endophallic sclerite longitudinal and slender, bifurcate apically, about 0.4× as long as aedeagus.

Female. Length 7.8–8.2 mm; width 5.3–5.6 mm. Similar to male, but underside dark brown; antenna (Fig. 85) filiform, antennomeres× and XI not swollen; length ratio of antennomeres II to XI about 1.0 : 1.2 : 1.9 : 1.8 : 1.9 : 1.9 : 1.7 : 1.9 : 2.1 : 2.6, and length to width ratios of II to XI about 2.0 : 2.0 : 3.2 : 3.4 : 3.5 : 3.4 : 3.3 : 3.5 : 4.8 : 4.3. Elytra wider than in male, length and width the same. Gonocoxae (Fig. 88) slender, about 4.4× longer than wide, joined from base to just before middle, apices tubular, straight and subparallel, with 9–10 apical setae, base rounded and slightly narrower than greatest width at middle, narrowing slightly at basal 1/3. Ventrite VIII (Fig. 89) with extremely long spiculum; apex very small and oval in shape, weakly sclerotized basally, disc with long scattered setae. Abdominal tergites I–III membranous with only the spiracles sclerotized, IV–VII entirely and strongly sclerotized. Receptacle of spermatheca (Fig. 90) slightly swollen, pump short and moderately curved, spermathecal duct wide and long.

Diagnosis. This new species can be distinguished from others by the following combination of characters: apical 1/3 of aedeagus narrowing slightly before widening slightly again subapically (aedeagus parallel in *S. babai* and widening basally in *S. sufangae* sp. n. and *S. meihuai* sp. n.), and straight subparallel apices of gonocoxae (curved apices of gonocoxae in *S. meihuai* sp. n., *S. babai*, and *S. sufangae* sp. n.).

Host plant. *Polygonum chinense* L. (Polygonaceae).

Etymology. This new species is named after Mrs. Su-Fang Yu, who is a member of TCRT and the first person to collect this new species.

Distribution. West half of South Cross-Island Highway (南橫公路) (Fig. 50).

Key to species of *Sikkimia* in Taiwan

1 Antenna filiform in male (Fig. 77); median longitudinal internal ridge on abdominal ventrite V reduced, extending from base to mid-length of extension (Fig. 49); endophallic sclerite of aedeagus joined from base to near apex (Fig. 79); abdominal tergites IV-VI of females membranous (Fig. 13); gonocoxae extremely wide, base much wider than medially, apex with numerous setae (Fig. 82) ..... ***S. tsoui* sp. n.**

– Antennomeres× and XI of males swollen (Figs 17, 51, 64, 84), median longitudinal internal ridge on abdominal ventrite V well developed, extending from base to apex of extension (Fig. 48), endophallic sclerite of aedeagus bifurcate apically (Figs 19, 53, 66, 86); abdominal tergite IV-VI of females entirely sclerotized (Fig. 14); gonocoxae slender, base subequal or narrower than in middle, apex with few setae (Figs 21, 55, 68, 88)..... **2**

2 Aedeagus narrowing slightly towards apical 1/3, widening slightly subapically (Fig. 86); median anterior ridge on antennomere XI extending into apical 1/3 in males (Figs 33–35, 45–47); apices of gonocoxae straight and subparallel (Fig. 88) ..... ***S. yuae* sp. n.**

– Aedeagus parallel-sided or widened basally (Figs 19, 53, 66); median ridge of antennomere XI abbreviated or curved outwards at middle in males (Figs 24–32, 36–44); apex of gonocoxa curved (Figs 21, 55, 68)..... **3**

3 Aedeagus slender, more than 5.9× longer than wide (Figs 19, 66); median ridge of antennomere XI curved medially in males (Figs 24–26, 30–32); gonocoxae slender, more than 3.6× longer than wide (Figs 21, 68)..... **4**

– Aedeagus wide, 4.8× longer than wide (Fig. 53); median ridge of antennomere XI abbreviated medially in males (Figs 27–29, 39–41); gonocoxae wide, about 2.7× longer than wide (Fig. 55)..... ***S. meihuai* sp. n.**

4 Aedeagus parallel-sided (Fig. 19); antennomere XI in males with a small process on inner antero-lateral surface and flat on outer antero-lateral surface (Figs 24–26, 36–38); gonocoxae sub-parallel (Fig. 21).... ***S. babai* (Kimoto)**

– Aedeagus wide basally (Fig. 66); antennomere XI in males without processes on inner antero-lateral area and depressed on outer antero-lateral area (Figs 30–32, 42–44); gonocoxae diverging (Fig. 68) ..... ***S. sufangae* sp. n.**

Species excluded from *Sikkimia*

As mentioned by Maulik (1936) and subsequently also by Bezděk and Zhang (2006), the descriptions of *S. metallica* Jacoby, 1903 and *S. tamra* Maulik, 1936 are very different to other *Sikkimia* and their position in *Sikkimia* was regarded as doubtful. In 2007, one of us (JB) examined the type specimens of both species. They are here moved from *Sikkimia* and to *Cerophysa* Chevrolat, 1836.

The reason why Jacoby (1903) classified his new species in *Sikkimia* is unknown to us. Probably he misinterpreted or overlooked some important characters like colour of uthe venter, impressions on the pronotum, or structure of the antennae. Duvivier (1891: 154) described the pronotal impressions as "présentant de chaque côté une profonde impression oblique" what probably allows some misinterpretations. The pronotum of *S. metallica* has transverse impression in the middle more or less interrupted medially. The differences in the structure of antennae Jacoby (1903) attributed to the sexual dimorphism as the specimens of *S. metallica* are females.

Maulik (1936) also did not examined true *S. antennata* as he published only the English translation of Duvivier´s description of *Sikkimia*. It is evident that he compared *S. tamra* with Jacoby´s *S. metallica* and thus mistakenly classified his species also in *Sikkimia*.

The main differencies between true *Sikkimia* species and *S. tamra* with *S. metallica* can be described as follows: true *Sikkimia* are large (6.1–12.0 mm), robust and convex species of orange, red or brown upperside, last two antennomeres in males are strongly

modified (except *S. tsoui* sp. n.), pronotum with antebasal transverse impression limited on sides by short longitudinal furrows and additional longitudinal groove parallel to lateral margin and procoxal cavities closed behind. The same characters of *S. tamra* and *S. metallica* (which simultaneously allow us to transfer both species to *Cerophysa*) are: body 5.5–6.0 mm long, narrow, subparallel, flat, with upperside metallic green, antennae without modifications; pronotum with transverse impression in the middle of pronotum and procoxal cavities open behind. The structure of antennae is variable throughout *Cerophysa*. In some species one, two or three antennomeres can be modified, but never last two antennomeres.

Cerophysa metallica (Jacoby, 1903), comb. n.

Sikkimia metallica Jacoby, 1903: 122.

Type locality. Nilgiri hills.

Type material. Syntype (♀, BMNH), labeled: "Nilgiri Hills (printed on white label) / 482 (handwritten on white label) / Type (printed on red label) / Sikkimia metallica Jac. (handwritten on blue label) / Andrewes Bequest B. M. 1922–221. (printed on white label)".

Cerophysa tamra (Maulik, 1936), comb. n.

Sikkimia tamra Maulik, 1936: 523.

Type locality. Nilgiri hills.

Type material. Syntype (unsexed, BMNH), labeled: "Type (printed on white round label with red collar) / Nilgiri Hills. G. F. Hampson 94–89. (printed on white label) / Sikkimia tamra M. S. Maulik TYPE 1935 (handwritten and printed on white label)".

Catalogue of *Sikkimia*

Sikkimia antennata Duvivier, 1891	Sikkim
Sikkimia babai (Kimoto, 1989), comb. n.	Taiwan
Sikkimia kabakovi (Lopatin, 2003)	Vietnam
Sikkimia meihuai sp. n.	Taiwan
Sikkimia miranda (Lopatin, 2003)	Vietnam
Sikkimia rufa (Chen, 1964)	China (Yunnan), Laos, Myanmar
Sikkimia sufangae sp. n.	Taiwan
Sikkimia tsoui sp. n.	Taiwan
Sikkimia yuae sp. n.	Taiwan

Discussion

Lee (2015) proposed a possible cause of brachelytry of leaf beetles for tropical forest habitats. Reduction of hind wings may result from the production of physogastric females. Nocturnal behavior increases survival since natural enemies are less of a threat. Males actively search for mates. As like survival at adverse environments such as islands, deserts and alpine regions, flight is not essential at night and energy can be diverted to egg production (Beenen and Jolivet 2008). Thus, brachelytry is a predictable evolutionary trend. Although no related reports for this hypothesis, wingless chrysomelids at tropical forest habitats can be used to test. Like Taiwanese populations of *Paraplotes*, those of *Sikkimia* are nocturnal with brachelytrous females. Moreover, the elytral calli of both sexes, and hind wings of males, are reduced. Thus Taiwanese populations of *Sikkimia* support this hypothesis of brachelytry in leaf beetles.

Species richness of *Sikkimia* in Taiwan (five species) is lower than that of *Paraplotes* (ten species) (Lee 2015), possibly due to several causes. All *Sikkimia* species are allopatric on the same mountain ranges and not separated by elevation. Only one *Sikkimia* species, *S. tsoui* sp. n., occupies northern and central Taiwan, whereas five species of *Paraplotes* are recorded from the same area. In addition to its wider distribution, *S. tsoui* sp. n. is abundant in some areas. For example, there were so many adults at Hsitou (溪頭) and Yuanyanghu (鴛鴦湖) that during one night 50 adults were collected at Hsitou and 51 at Yuanyanghu. Both features may be the result of some autamorphic characters in *S. tsoui* sp. n. Males of *S. tsoui* sp. n. have no enlarged apical antennomeres, a character that may be involved in courtship behavior. Lack of this secondary sexual character may result in low speciation. The ability to feed on a wide range of host plants, weak sclerotization of abdominal tergites, and the unique shape of gonocoxae may increase the fitness of this species.

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